walkBoston®

Walk Assessment

Brockton, MA

October 21, 2014

Massachusetts Department of Transportation
Bicycle and Pedestrian Safety Program

in partnership with Massachusetts Department of Public Health

MAKING MASSACHUSETTS MORE WALKABLE
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Report Scope and Purpose

WalkBoston conducted this walk assessment as part of the Massachusetts Department of Transportation Bicycle and Pedestrian Safety Program, in association with the Massachusetts Department of Public Health. WalkBoston is a pedestrian advocacy organization whose mission is to make walking safer and easier in Massachusetts to encourage better health, a cleaner environment and vibrant communities. The purpose of the walk assessment is to develop knowledge and awareness of the pedestrian environment at the state and municipal level.

This walk assessment report summarizes the observations made along the walk route and makes recommendations for improvements to the built environment. The observations vary from specific infrastructure deficits (e.g., faded crosswalk, uneven sidewalk) to general comments on traffic speeds or land use patterns (e.g., vacant storefronts). Likewise, the recommendations range from individual fixes (e.g., paint the crosswalk) to suggestions for further study (e.g., evaluate the feasibility of installing raised crosswalks). The assessment is not meant to be a complete inventory of infrastructure deficiencies, nor is it meant to provide specific designs for improvement.

WalkBoston leads these assessments as a means to build local capacity for improving the built environment for walking and not as a complete inventory of walking conditions. WalkBoston staff members are not licensed design or engineering professionals. This report may be used as a resource for municipal staff and for design professionals who may be engaged by municipalities to program and design infrastructure improvements.

Brockton Walk Assessment

The City of Brockton is one of twelve communities participating in the Massachusetts Department of Transportation's (MassDOT's) multi-disciplined program to improve bicycle and pedestrian safety in Massachusetts. One component of the MassDOT program is to conduct walk assessments. The assessments have three goals:

1. Foster an awareness of the infrastructure elements which contribute to the walking environment
2. Evaluate the safety and quality of the walking environment along the route
3. Recommend infrastructure improvements

The City of Brockton identified several high-priority intersections that are particularly dangerous for pedestrians and cyclists. With input from the Old Colony Planning Council, City officials and staff, and the Brockton Police Department, WalkBoston established a walking route that included two of the identified intersections, the site of a new grocery store, and the downtown retail area along Legion Parkway.

Pedestrian safety is on the minds of Brockton residents, police and municipal officials given that Brockton has experienced 9 pedestrian fatalities so far in 2014. Since January 1, 2014, there have been over 77 motor vehicle crashes involving pedestrians according to Brockton police. In 2013, there were 87 crashes involving pedestrians, only 1 of which resulted in a fatality. The Brockton Mayor's office recently released a pedestrian safety plan based on some of the preliminary findings of this walk assessment.

The walk assessment was conducted in Brockton on October 21, 2014, from 1:00 to 3:00 pm. The weather conditions were poor. It was raining and cool with temperatures in the mid-50s.

Walk assessment participants braved the wet and windy conditions along N Main Street

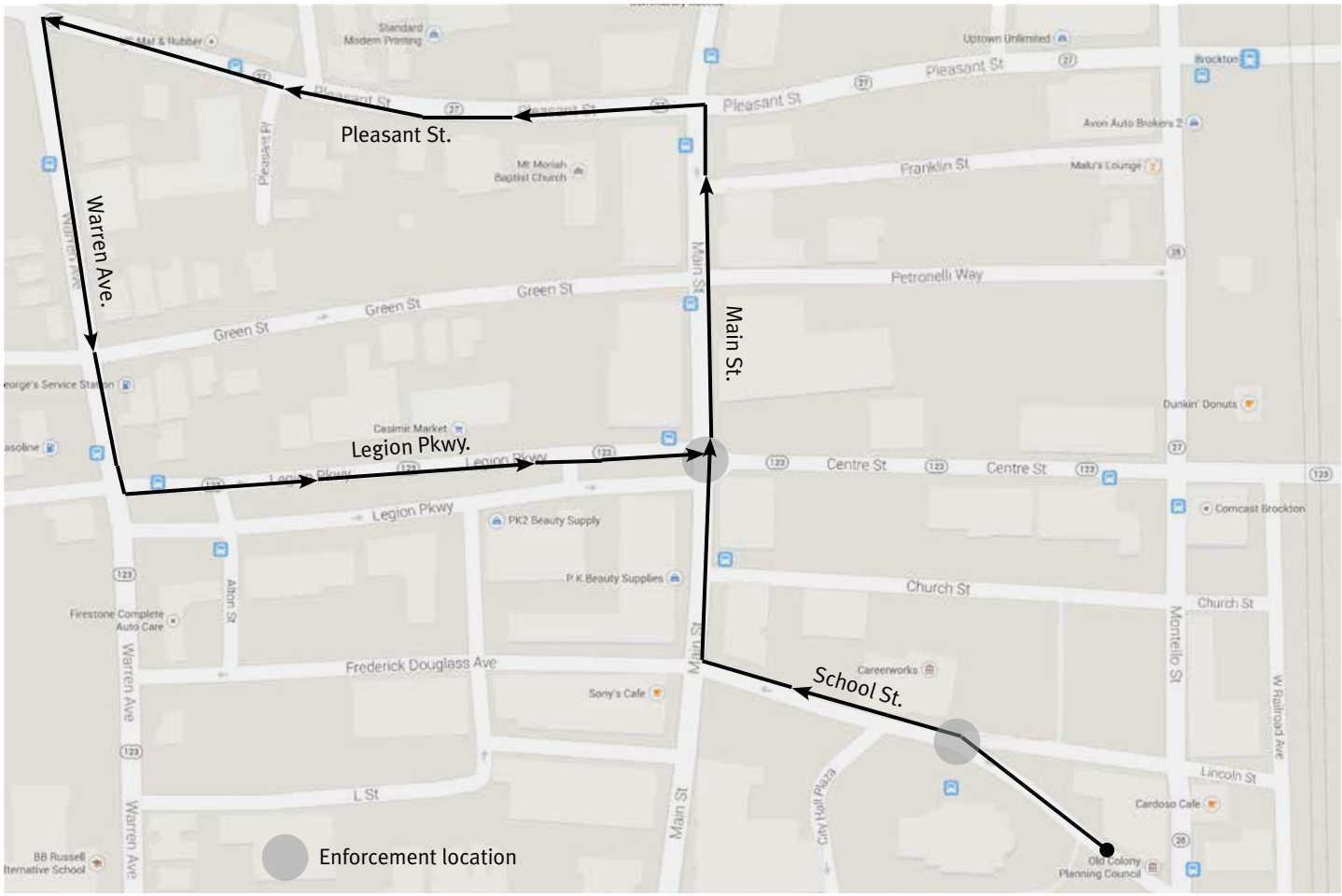
Study Area

The walk assessment began at the Old Colony Planning Council (OCPC) office on School Street. Participants walked north on N Main Street, west on Pleasant Street, south on Warren Avenue, east on Legion Parkway and then back down N Main to School Street and the OCPC office. Participants encountered several sidewalk construction projects, the grocery store construction site, and the site improvements around City Hall.

This area of downtown Brockton has a general lack of retail/commercial activity that results in fewer pedestrians on its streets. The City discussed ways in which zoning can contribute to increasing first-floor level activity and help to minimize the empty windows seen in some downtown buildings. Efforts are underway to renovate historic buildings and increase housing opportunities near the commuter rail station.

Vehicle traffic is heavy in some locations, but the absence of pedestrians contributes to the overall car dominance of the downtown. For those walking around downtown Brockton, the pedestrian infrastructure could do more to prioritize their movements. Upon observation, many pedestrians in Brockton crossed streets at signalized intersections with little attention paid to pedestrian signal indications. Enhancements to pedestrian infrastructure and continued enforcement/awareness campaigns around pedestrian safety could work together to improve safety for all modes of travel in the City.

Main Street and Warren Avenue function as a one-way pair moving traffic quickly in and out of downtown Brockton. According to OCPC and Brockton City staff, there have been discussions about converting these street to two-way traffic. Two-way traffic has many benefits, including decreasing travel speeds and increasing downtown business vitality. Downtown districts thrive when people using all travel modes slow down, stop and visit the businesses and institutions located downtown (libraries, health centers, social services, post office, etc.). The conversion of Main and Warren to two-way traffic should be undertaken with an overall assessment of business/parking conditions in the downtown and the extent to which pedestrian movements would be made safer.



Map of Brockton walk assessment route

Overall Conditions/Observations of the Walk Assessment Route

Participants made the following observations about the overall conditions along the walking route:

- Pedestrian traffic signal timing does not prioritize the pedestrian; crossing time seems short at most intersections; all signals use an exclusive pedestrian phase; no pedestrian countdown signals
- Roads designed for cars and drivers, not for other modes of transportation
- Sidewalks are narrow; roadside signs seem low
- Most crossings do not have ADA-compliant curb ramps and detectable warning strips
- No wayfinding signs
- Lack of pedestrian-scale lighting
- Pedestrians do not comply with traffic signals and cross wherever it is most convenient for them

Specific Observations and Recommendations for Locations along the Route

School Street/Main Street

School Street is one-way from Montello Street to Main Street and intersects with Lincoln Street in front of City Hall. The road right-of-way is relatively wide, and pavement markings do a reasonable job of delineating parking lanes, right-turn only lanes, and no parking zones. This section of School Street is currently under construction; new curb ramps and detectable warning strips are in place at the two un-signalized crossings. Crosswalks on School Street use continental design pavements markings, although those on neighboring Lincoln Street use only the minimal two parallel line design.

Main Street is a two-lane, one-way street carrying traffic northbound. The intersections along Main Street, including the School/Main intersection, recently received new curb ramps and detectable warning strips. In some locations, pedestrian traffic signals have also been upgraded. The City has plans to further improve the streetscape this spring with sidewalk paving enhancements, new tree grates and new pedestrian scale lighting.

The pedestrian signal head is not lined up with the crosswalk entrance on N Main Street

Current infrastructure deficiencies:

- Pedestrian signal indication is not lined up with crosswalk entrance; adjacent to crosswalk, but easy to miss
- Exclusive pedestrian phase on traffic signal; wait time seems long given one-way traffic pattern; not a countdown signal
- Crosswalk pavement markings were minimal; may be temporary given that construction project is still underway
- Travel lanes are wide and crossing distances are relatively long

Recommendations:

- Determine if pedestrian signal head could be rotated or moved to pole visible at crosswalk entrance
- Evaluate signal phasing to determine if a concurrent phase is possible and if the pedestrian crossing time is sufficient. Before switching to a concurrent phase, evaluate the red light running frequency, clearance and change interval, and crash data to be sure motorists typically comply with the existing signal. Add leading pedestrian indicator (LPI) with concurrent phase, if appropriate
- Enhance pavement markings with a ladder design, or stamped colored asphalt

- Install curb bump-outs to better define parking zones, narrow travel lanes and shorten crossing distances; long-term fix given recent curb ramp upgrades

Main Street/Legion Parkway Intersection

The Main Street/Legion Parkway intersection is expansive due to the design of Legion Parkway, a 4-lane street divided by a wide median. Pedestrians crossing Legion Parkway at this intersection have a long crossing distance across multiple travel lanes and bus stops. The median acts as a pedestrian refuge island, but was not designed for this purpose.

Current infrastructure deficiencies:

- Multiple pedestrian push buttons and traffic control equipment on the east side of Main Street intersection; the older of the two pedestrian push buttons continues to control pedestrian phase; could be due to construction in progress
- Crossing time is not sufficient when crossing Legion Parkway, unless intersection is timed as a 2-phase crossing; if 2-phase crossing, there is no pedestrian push button in the median
- Median in Legion Parkway is being used as a pedestrian refuge island, but does not provide adequate protection

There are two pedestrian push buttons at this location; only one of which controls the signal

- Pedestrian traffic signal is not a countdown signal
- Crosswalk pavement markings are minimal; may be temporary given that construction project is still underway
- Travel lanes are wide and crossing distances are relatively long; particularly across Legion Parkway

Recommendations:

- Remove one of the two pedestrian push-button to eliminate confusion around which button controls the signal
- Evaluate signal phasing to determine if a concurrent phase is possible and if the pedestrian crossing time is sufficient, particularly across Legion Parkway. Pedestrians cross the entire width of Legion Parkway in one phase and the crossing time should reflect this practice. Before switching to a concurrent phase, evaluate the red light running frequency, clearance and change interval, and crash data to be sure motorists typically comply with the existing signal. Add leading pedestrian indicator (LPI) with concurrent phase, if appropriate
- Redesign median to work as a pedestrian refuge island to protect pedestrians who get stuck in roadway; install pedestrian push button to facilitate a protected crossing from the island
- Install pedestrian countdown signal
- Enhance pavement markings with a ladder design, or stamped colored asphalt
- Install curb bump-outs to better define parking zones and bus stops, narrow travel lanes and shorten crossing distances

Main Street/Pleasant Street Intersection

Pleasant Street (Route 27) is a heavily trafficked route leading west to the Route 24. At the Main/Pleasant intersection, the road carries one lane of traffic in each direction with a left turn lane for traffic going north on Main Street.

Current infrastructure deficiencies:

- No accommodations for pedestrians during sidewalk construction; forced into the street at the intersection
- Travel lanes seem wide
- Parking is sporadic and undifferentiated
- Crosswalks are minimal
- Signal phasing is exclusive for pedestrians

Recommendations:

- Enforce a requirement to provide accommodations for pedestrians during sidewalk construction on all projects within the City of Brockton
- Delineate travel lane (10.5'-11') on Pleasant Street with an edge line; current edge line provides for wider travel lane
- Regularize and delineate parking zones on Pleasant Street
- Enhance pavement markings with a ladder design, or stamped colored asphalt
- Evaluate signal phasing to determine if a concurrent phase is possible and if the pedestrian crossing time is sufficient. Before switching to a concurrent phase, evaluate the red light running frequency, clearance and change interval, and crash data to be sure motorists typically comply with the existing signal. Add leading pedestrian indicator (LPI) with concurrent phase, if appropriate

Pleasant Street between Main and Warren

Pleasant Street between Main and Warren is a two-way road with one lane in each direction. The traffic moves relatively quickly for a downtown setting. There is only one marked crosswalk between Main and Warren and few reasons for cars to drive slower given the width of Pleasant Street and the few destinations along this section of street. Furthermore, there are several vacant storefronts and empty lots, which can make those walking feel vulnerable.

Lack of pedestrian accommodations during construction at the intersection of Main Street and Pleasant Street

Unprotected mid-block crossing on Pleasant Street

Current infrastructure deficiencies:

- Mid-block crossing in front of the Mt. Moriah Baptist Church has no curb ramps, detectable warning strips, or pedestrian crossing signage
- Only one marked crossing on Pleasant Street between Main and Warren
- Crosswalks at intersections and mid-block are faded

Recommendations:

- Evaluate the safety of the mid-block crossing at the Baptist Church; if appropriate, install ADA-compliant curb ramps, detectable warning strips, and pedestrian crossing signage
- Consider another marked crossing on Pleasant Street; both to provide another recognized crossing point for pedestrians and to increase driver awareness of operating speeds by providing more "visual friction" along the roadway. Visual friction includes signage, landscape elements or other horizontal or vertical features in the roadway that encourage drivers to check their speeds
- Re-stripe crosswalks

Pleasant Street/Warren Avenue Intersection

This intersection is irregular as Warren Avenue crosses Pleasant Street at an angle. The angles create long crossing distances across Pleasant Street and complicate the location of a crosswalk in relationship to the traffic signal. The sidewalks, curb ramps and traffic signals at and near the Pleasant/Warren intersection were replaced in the summer of 2014 – within the timeframe of this assessment. The final pavement markings were not yet in place at the time of the assessment.

The intersection geometries were not changed during the sidewalk replacement project, but the location of the curb ramps did change. The ramps were moved away from the intersection and placed on the tangent to the curve along each curb. These locations shorten crossing distances and provide a straight path from one sidewalk to the next. However, the crosswalks and ramps are outside pedestrian desire lines; in some cases, the crosswalk is back so far from the intersection that pedestrians may not walk within the crosswalk and cars may stop beyond the stop line and block the crossing.

A new grocery store is being constructed at the corner of Pleasant and Warren and will generate more pedestrian traffic at this intersection. Parking is located in the front of the building, which is pushed back from the street. Brockton Area Transit (BAT) runs along both Pleasant Street and Warren Avenue giving access to the grocery store for public transit users. The grocery store site plan includes pedestrian connections from Pleasant and Warren Streets through the parking areas to the grocery store.

Pleasant Street and Warren Street intersection geometry creates complicated crossing issues

Current infrastructure deficiencies:

- Crosswalks and curb ramps are outside pedestrian desire lines
- No countdown pedestrian traffic signals
- Traffic signal is exclusive for pedestrians despite one-way traffic on Warren Street
- Grocery store is a major change in land use and will alter pedestrian patterns

Recommendations:

- Re-evaluate curb ramp and crosswalk locations to maximize pedestrian compliance with traffic signals while meeting ADA requirements
- Replace pedestrian traffic signal equipment with countdown signals. Evaluate signal phasing to determine if a concurrent phase is possible and if the pedestrian crossing time is sufficient. Before switching to a concurrent phase, evaluate the red light running frequency, clearance and change interval, and crash data to be sure motorists typically comply with the existing signal. Add leading pedestrian indicator (LPI) with concurrent phase, if appropriate
- Evaluate bus stop locations in conjunction with grocery store site plan and coordinate pathways to the store with bus stops to serve public transit users
- Study the pedestrian patterns around the new grocery store once completed, and alter the pathways to improve pedestrian safety, if needed

Warren Avenue between Pleasant and Legion Parkway

Warren Avenue (Rt. 123) is a two-lane road carrying traffic southbound. This section of road is underdeveloped and therefore has few pedestrians since there are few destinations. The planned grocery store will increase pedestrian and vehicular traffic in this area. There is one marked crosswalk between Pleasant and Legion leading to a church and a BAT bus stop. Once the grocery store opens, this crosswalk will most likely see more walkers. Currently, this crosswalk appears underutilized.

Current infrastructure deficiencies:

- Mid-block crosswalk has no curb ramps, pedestrian crossing signs or tactile warning panels
- Sidewalks are poorly maintained; vegetation is overgrown

- Service stations on both sides of the Green Street intersection have extensive curb cuts which compromise the safety of the sidewalks

Recommendations:

- Evaluate the current location of the mid-block crosswalk in conjunction with the planned grocery store site plan. If appropriately located, install curb ramps, pedestrian signage, and tactile warning strips to make this crossing ADA compliant
- Upgrade sidewalks on both sides of Warren Avenue to promote walking to the new grocery store
- Work with the service station owners to reduce the width of the curb cuts to improve sidewalk network

Mid-block crosswalk on Warren Street may not be in the appropriate location

Wide curb cuts along Warren Street compromise sidewalks

Warren Avenue/Legion Parkway

This signalized intersection has crosswalks, but no pedestrian phase or traffic signal equipment to provide a protected pedestrian crossing. Legion Parkway has an incredibly wide right-of way with an expansive median separating traffic moving east and west. At the intersection, the westbound side has a left turn lane and a through lane. The eastbound side has no pavement markings, but appears to be just one lane. Warren Avenue continues as a one-way, two-lane city arterial moving traffic southbound.

Current infrastructure deficiencies:

- No protected crossing for pedestrians in any direction at the Warren Ave/Legion Pkwy intersection; no pedestrian signal heads and no pedestrian phase
- Long crossing distances particularly across the Legion Parkway – the equivalent of six lanes of traffic
- Limited lane definition on both eastbound and westbound lanes on Legion Parkway; promotes faster turning movements and allows drivers to interpret the number of acceptable travel lanes
- The northeast and southeast corners of Legion Parkway are occupied by service stations with wide curb cuts, which compromise the pedestrian zone. Pedestrians must watch for oncoming traffic, turning traffic and motorists leaving the service stations
- The median functions as a pedestrian refuge island, but was not designed for this purpose; the median is not ADA-compliant
- No tactile warning panels on the curb ramps

Legion Parkway and Warren Street intersection has no pedestrian crossing phase

Recommendations:

- Upgrade traffic signal equipment and install pedestrian countdown signals. Include a pedestrian phase that is long enough to allow pedestrians to cross the entire distance across Legion Parkway
- Consider installing curb extensions across Legion Parkway to shorten the crossing distance
- Use pavement markings to improve lane definition and narrow wide travel lanes
- Work with the service station owners to reduce the width of the curb ramps to minimize the number of entrances pedestrians need to scrutinize before crossing the street
- Redesign median to function as an effective, ADA-compliant pedestrian refuge island
- Install tactile warning panels on all curb ramps

Legion Parkway

Legion Parkway is a major destination for Brockton residents for shopping, errands (post office etc.) and health services. Most storefronts are occupied with some local businesses thriving. Overall, there is a need for increased economic activity to stimulate vibrancy in this area. Improving walkability could contribute to the revitalization efforts.

Legion is a median-separated, two-way street with angled parking on both sides in each travel direction. The travel lanes allow adequate space for backing out of angled parking spaces. The median is wide enough (close to 15') to be considered a linear park especially with existing street trees and pedestrian-scaled lighting along its entire length.

Wide sidewalk on Legion Parkway

Sidewalks along the storefronts are wide with an adequate walking zone. Street trees help to mitigate the otherwise automobile-dominated space. Once away from the storefronts, Legion only accommodates the needs of the car. Pedestrians cross at will from between cars parked along the median.

BAT has three bus stops on Legion providing access to eight bus routes. There is room for buses to pull out of travel lane to pick up and drop off passengers. One participant was almost clipped by a bus mirror as the bus pulled up to the curb.

Aerial view of Legion Parkway

Current infrastructure deficiencies:

- No marked crosswalks between Warren Avenue and Main Street
- Median is not accessible – no curb ramps; could be re-designed as a useable open space
- Travel lanes and bus stops could be better defined
- Angled parking layout causes drivers to back blindly into the roadway

Recommendations:

- Evaluate locations for one or more pedestrian crosswalks across Legion Parkway based on land use and current pedestrian patterns and install permanent street crossings
  - » Test different locations with temporary removal of parking spaces and delineation of crossing zones; use in-street pedestrian signs to bring awareness to the crossing area
  - » Install permanent curb extensions and pavement markings at appropriate location(s); pavement markings could be enhanced crosswalks, such as a ladder design, or stamped asphalt
- Redesign the median to provide accessible crossing point(s) that correspond with new crosswalk(s); consider redesigning median as a linear park – increase width to provide central gathering spaces with street furnishings; create pedestrian-friendly spaces
- Evaluate lane widths and bus stop locations; use pavement marking to better define lanes and bus stops
- Install pedestrian signage: both “yield to pedestrians” signs and in-street pedestrian signs at new designated crossings
- Consider re-striping parking from front-in angled parking to back-in angled parking. Maintains the current number of spaces, but increases safety for all road users; better line of sight for drivers to on-coming traffic including bicyclists and pedestrians; passenger doors, when open, direct passengers directly to the sidewalk (helps to prevent kids running toward moving traffic)

Wide median runs continuously down Legion Parkway between the two rows of angled parking. There may be an opportunity to rethink this space as a people-oriented gathering space.

There are no marked crosswalks for the length of Legion Parkway. Pedestrians wait for a gap in traffic and cross from between parked cars to reach neighboring businesses.

Appendix A. Summary of Issues and Recommendations

School Street/Main Street

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
Pedestrian signal indication is not lined up with crosswalk entrance; adjacent to crosswalk, but easy to miss	Determine if pedestrian signal head could be rotated or moved to pole visible at crosswalk entrance	Long-term	City of Brockton, Mass Dept of Transportation
Exclusive pedestrian phase on traffic signal; wait time seems long given one-way traffic pattern; not a countdown signal	» Evaluate signal phasing to determine if a concurrent phase is possible and if the pedestrian crossing time is sufficient	Short-term	City of Brockton
	» Replace signal equipment and install countdown signal	Long-term	City of Brockton, Mass Dept of Transportation
Crosswalk pavement markings were minimal	Enhance pavement markings with a ladder design, or stamped colored asphalt	Short-term	City of Brockton
Travel lanes are wide and crossing distances are relatively long	Install curb bump-outs to better define parking zones, narrow travel lanes and shorten crossing distances	Long-term	City of Brockton, Mass Dept of Transportation

Main Street/Legion Parkway

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
Multiple pedestrian push buttons and traffic control equipment on the east side of Main Street intersection	Remove one of the two pedestrian push-button to eliminate confusion around which button controls the signal	Short-term	City of Brockton
Crossing time is not sufficient when crossing Legion Parkway, unless intersection is timed as a 2-phase crossing; if 2-phase crossing, there is no pedestrian push button in the median	Evaluate signal phasing to determine if a concurrent phase is possible and if the pedestrian crossing time is sufficient, particularly across Legion Parkway. Add leading pedestrian indicator (LPI) with concurrent phase, if appropriate.	Long-term	City of Brockton
Median is being used as a pedestrian refuge island, but does not provide adequate protection	Redesign median to work as a pedestrian refuge island to protect pedestrians who get stuck in roadway; install pedestrian push button to facilitate a protected crossing from the island	Long-term	City of Brockton
Pedestrian traffic signal is not a countdown signal	Install pedestrian countdown signal	Long-term	City of Brockton
Crosswalk pavement markings were minimal	Enhance pavement markings with a ladder design, or stamped colored asphalt	Short-term	City of Brockton
Travel lanes are wide and crossing distances are relatively long; particularly across Legion Parkway	Install curb bump-outs to better define parking zones and bus stops, narrow travel lanes and shorten crossing distances	Long-term	City of Brockton

Main Street/Pleasant Street

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
No accommodations for pedestrians during sidewalk construction; forced into the street at the intersection	Enforce a requirement to provide accommodations for pedestrians during sidewalk construction on all projects within the City of Brockton	Short-term	City of Brockton
Travel lanes seem wide	Delineate travel lane (10.5'-11') on Pleasant Street with an edge line; current edge line provides for wider travel lane	Short-term	City of Brockton
Parking is sporadic and undifferentiated	Regularize and delineate parking zones on Pleasant Street	Short-term	City of Brockton
Crosswalks are minimal	Enhance pavement markings with a ladder design, or stamped colored asphalt	Short-term	City of Brockton
Signal phasing is exclusive for pedestrians	» Evaluate signal phasing to determine if a concurrent phase is possible and if the pedestrian crossing time is sufficient. Add leading pedestrian indicator (LPI) with concurrent phase, if appropriate.	Short-term	City of Brockton
	» Replace signal equipment and install countdown signal	Long-term	City of Brockton

Pleasant Street between Main and Warren

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
Mid-block crossing in front of the Mt. Moriah Baptist Church has no curb ramps, detectable warning strips, or pedestrian crossing signage	Evaluate the safety of the mid-block crossing at the Baptist Church; if appropriate, install ADA-compliant curb ramps, detectable warning strips, and pedestrian crossing signage	Short-term	City of Brockton
Only one marked crossing on Pleasant Street between Main and Warren	Consider another marked crossing on Pleasant Street; both to provide another recognized crossing point for pedestrians and to increase driver awareness of operating speeds	Long-term	City of Brockton
Crosswalks at intersections and mid-block are faded	Re-stripe crosswalks	Short-term	City of Brockton

Pleasant Street/Warren Avenue

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
Crosswalks and curb ramps are outside pedestrian desire lines	Re-evaluate curb ramp and crosswalk locations to maximize pedestrian compliance with traffic signals while meeting ADA requirements	Short-term	City of Brockton
No countdown pedestrian traffic signals	Replace pedestrian traffic signal equipment with countdown signals. Evaluate signal phasing to determine if a concurrent phase is possible and if the pedestrian crossing time is sufficient. Add leading pedestrian indicator (LPI) with concurrent phase, if appropriate.	Long-term	City of Brockton
Grocery store is a major change in land use and will alter pedestrian patterns	» Evaluate bus stop locations in conjunction with grocery store site plan and coordinate pathways to the store with bus stops to serve public transit users	Short-term	City of Brockton
	» Study the pedestrian patterns around the new grocery store once completed, and alter the pathways to improve pedestrian safety, if needed	Long-term	

Warren Avenue between Pleasant and Legion Parkway

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
Mid-block crosswalk has no curb ramps, pedestrian crossing signs or tactile warning panels	Evaluate the current location of the mid-block crosswalk in conjunction with the planned grocery store site plan. If appropriately located, install curb ramps, pedestrian signage, and tactile warning strips to make this crossing ADA compliant	Short-term	City of Brockton
Sidewalks are poorly maintained; vegetation is overgrown	Upgrade sidewalks on both sides of Warren Avenue to promote walking to the new grocery store	Short-term	City of Brockton
Service stations on both sides of the Green Street intersection have extensive curb cuts which compromise the safety of the sidewalks	Work with the service station owners to reduce the width of the curb ramps to improve sidewalk network	Long-term	City of Brockton

Warren Avenue/Legion Parkway

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
No protected crossing for pedestrians in any direction at the Warren Ave/Legion Pkwy intersection; no pedestrian signal heads and no pedestrian phase	Upgrade traffic signal equipment and install pedestrian countdown signals. Include a pedestrian phase that is long enough to allow pedestrians to cross the entire distance across Legion Parkway	Long-term	City of Brockton
Long crossing distances particularly across the Legion Parkway – the equivalent of six lanes of traffic	Consider installing curb extensions across Legion Parkway to shorten the crossing distance	Long-term	City of Brockton
Limited lane definition on both eastbound and westbound lanes on Legion Parkway	Use pavement markings to improve lane definition and narrow wide travel lanes	Short-term	City of Brockton
Northeast and southeast corners of Legion Parkway are occupied by service stations with wide curb cuts which compromise the pedestrian zone	Work with the service station owners to reduce the width of the curb ramps	Long-term	City of Brockton
The median functions as a pedestrian refuge island, but was not designed for this purpose; the median is not ADA-compliant	Redesign median to function as an effective, ADA-compliant pedestrian refuge island	Long-term	City of Brockton
No tactile warning panels on the curb ramps	Install tactile warning panels on all curb ramps	Long-term	City of Brockton

Legion Parkway

ISSUE	RECOMMENDATION	TIMEFRAME	RESPONSIBLE PARTY
No marked crosswalks between Warren Avenue and Main Street	Evaluate locations for one or more pedestrian crosswalks across Legion Parkway based on land use and current pedestrian patterns and install permanent street crossings		
	» Test different locations with temporary removal of parking spaces and delineation of crossing zones; use in-street pedestrian signs to bring awareness to the crossing area	Short-term	City of Brockton
	» Install permanent curb extensions and pavement markings at appropriate location(s); pavement markings could be enhanced crosswalks, such as a ladder design, or stamped asphalt	Long-term	City of Brockton
	Consider more dramatic changes to the roadway to prioritize pedestrians in this downtown district, such as changing paving materials to colored, textured asphalt; narrowing the roadway; increasing tree plantings; and/or reducing on-street parking	Long-term	City of Brockton
Median is not accessible – no curb ramps; could be re-designed as a useable open space	Redesign the median to provide accessible crossing point(s) that correspond with new crosswalk(s); consider redesigning median as a linear park – increase width to provide central gathering spaces with street furnishings; create pedestrian-friendly spaces	Long-term	City of Brockton
Travel lanes and bus stops could be better defined	Evaluate lane widths and bus stop locations; use pavement marking to better define lanes and bus stops	Short-term	City of Brockton
Angled parking layout causes drivers to back blindly into the roadway	Consider re-striping parking from front-in angled parking to back-in angled parking. Maintains the current number of spaces, but increases safety for all road users; better line of sight for drivers to on-coming traffic including bicyclists and pedestrians; passenger doors, when open, direct passengers directly to the sidewalk (helps to prevent kids running toward moving traffic)	Long-term	City of Brockton

Appendix B. Participant List

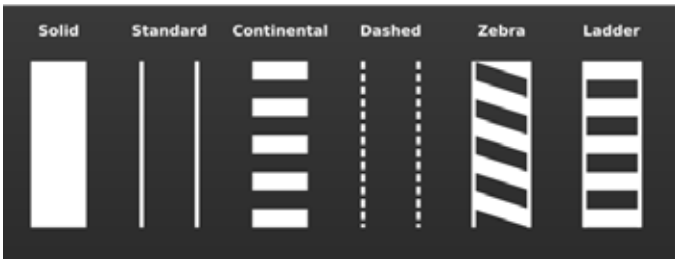
NAME	ORGANIZATION
Shaynah Barnes	City of Brockton
Stacey Beuttell	WalkBoston
Paul Chenard	Old Colony Planning Council
Pat Ciaramella	Old Colony Planning Council
Dorothea Hass	WalkBoston
Melissa Kalicin	MassDOT OTP
Charles Kilmer	Old Colony Planning Council
Rob May	City of Brockton
Shane O'Brien	City of Brockton
Jimmy Pereira	Old Colony Planning Council
Erin Reed	Massachuset Safe Routes to School
Lisa Schletzbaum	MassDOT Safety

Appendix C. Terminology

Below are images and definitions of the terms used to describe the walking environment in this report.

Crosswalk and stop line

Crosswalks can be painted in a variety of ways, some of which are more effective in warning drivers of pedestrians. Crosswalks are usually accompanied with stop lines. These lines act as the legally mandated stopping point for vehicles, and discourage drivers from stopping in the middle of the crosswalk.



Crosswalk patterns
Source: USFHA

Crosswalk and stop line
Source: http://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_scdproj/sys_impact_rpt/images/fig16.jpg

Curb ramp and detectable warning strip

Curb ramps provide access from the sidewalk to the street for people using wheel chairs and strollers. They are most commonly found at intersections. While curb ramps have improved access for wheelchair-bound people, they are problematic for visually impaired people who use the curb as an indication of the side of the street. Detectable warning strips, a distinctive surface pattern of domes detectable by cane or underfoot, are now used to alert people with vision impairments of their approach to streets and hazardous drop-offs.

Curb ramp and detectable warning strip in Woburn, MA

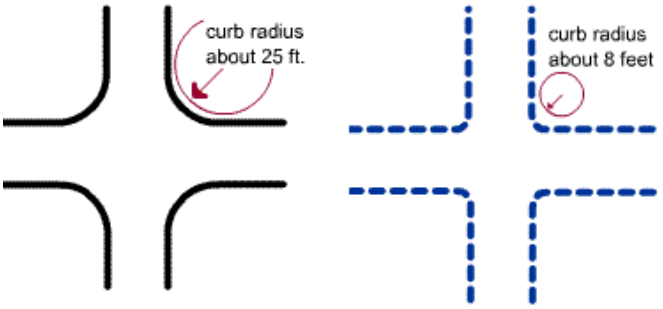
Curb extension/curb bulb-out

A sidewalk extension into the street (into the parking lane) shortens crossing distance, increases visibility for walkers and encourages eye contact between drivers and walkers.

Curb extensions are often associated with mid-block crossings

Curb radius

A longer curb radius (on the left in figure below) allows vehicles to turn more quickly and creates longer crossing distance for pedestrians. A shorter curb radius (on the right in the figure below) slows turning speeds and provides pedestrians shorter crossing distances.



There are two excellent examples of the shortening of curb radii in Woburn, MA. The first (A) is a low- cost solution using a gravel-filled zone between the original curb line and the newly established road edge. The second is a higher-cost solution using grass and trees and extending the sidewalks to the new curb. Both work to slow traffic.

Edge line

An edge line is a solid white line painted along the roadside curb that defines the driving lane and narrows the driver's perspective. Edges lines are most often used in suburban and rural locations, but may be appropriate in some urban conditions.

Edge lines delineate the vehicular driving zone on wide roadways.

(A) Gravel-filled curb extension

(B) Grass, trees and extended sidewalk in curb extension

In-street pedestrian crossing sign

In-street pedestrian crossing signs are used at the road centerline within crosswalks to increase driver awareness of pedestrians in the area. These signs are a relatively low-cost, highly effective tool in slowing traffic by the narrowing travel lanes. They are popular with road maintenance departments since they can be easily moved for snow removal.

Leading Pedestrian Indicator (LPI)

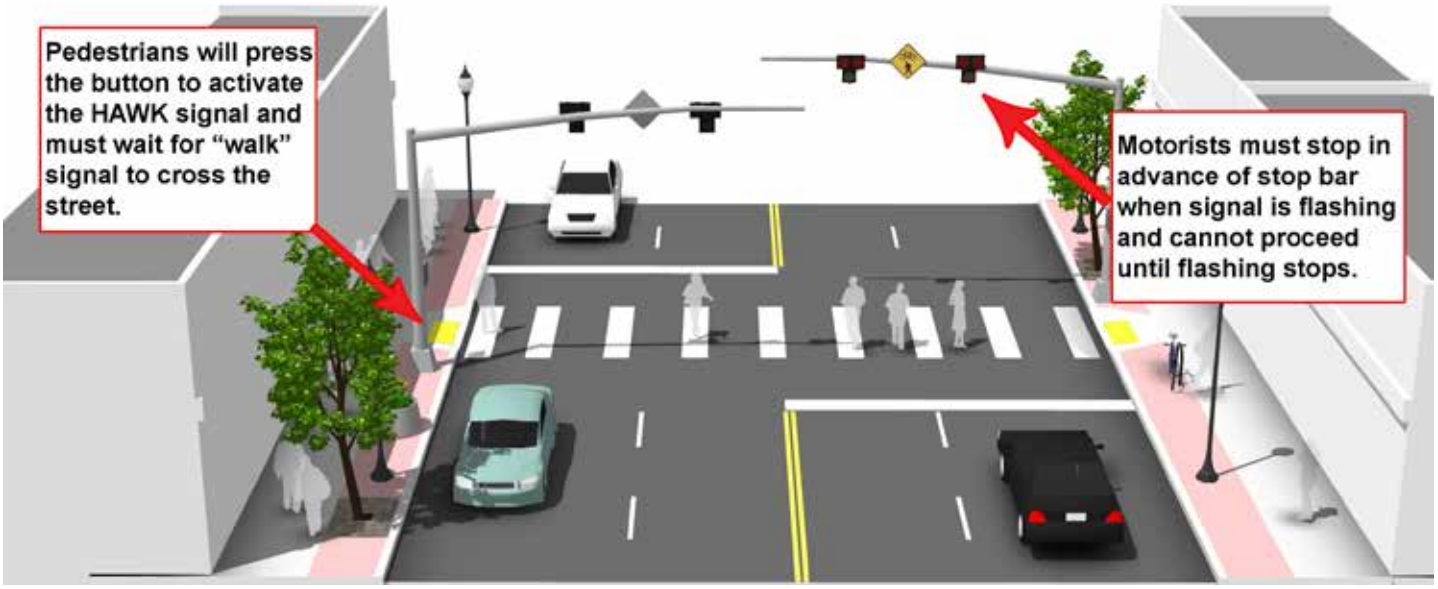
A leading pedestrian indicator gives pedestrians an advance walk signal before motorists get a green signal, giving the pedestrian several seconds to start walking in the crosswalk before a concurrent signal is provided to vehicles. This makes pedestrians more visible to motorists and motorists more likely to yield to them. Typical LPI settings provide 3 to 6 seconds of advance walk time.

Source: http://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_scdproj/sys_impact_rpt/images/fig34.jpg

High-Intensity Activated crossWalk (HAWK)

A HAWK beacon (High-Intensity Activated crossWalK beacon) is a traffic signal used to stop road traffic and allow pedestrians to cross safely. It is officially known as a Pedestrian Hybrid Beacon (PHB). The purpose of a HAWK beacon is to allow protected pedestrian crossings, stopping road traffic only as needed. Where standard traffic signal 'warrants' prevent the installation of standard three-color traffic signals, the HAWK beacon provides an alternative.

Source: http://www.achdidaho.org/Projects/Images/NewHawkSignal092209% 20014.jpg


Pedestrians will press the button to activate the HAWK signal and must wait for "walk" signal to cross the street.
Motorists must stop in advance of stop bar when signal is flashing and cannot proceed until flashing stops.

Source: http://bloomington.in.gov/media/media/image/jpeg/13144.jpg

Pedestrian Refuge Island

Pedestrian refuge islands are protected areas where people may safely pause or wait while crossing a street. Pedestrian refuge islands are particularly helpful as resting areas for seniors, persons with disabilities, children, and others who may be less able to cross the street in one stage. At signalized intersections, they allow slow moving pedestrians to cross in two phases. At unsignalized locations, they simplify the act of finding a gap in traffic to cross since vehicles from only one direction must be reckoned with at a time.

http://www.sfbetterstreets.org/find-project-types/pedestrian-safety-and-traffic-calming/traffic-calming-overview/medians-and-islands/

Pedestrian refuge island at a signalized crossing
Source:http://safety.fhwa.dot.gov/intersection/resources/fhwasa06016/images/fig95.jpg

Appendix D. Walk Assessment Tool

walkBoston

Street Name/Intersection	
Date/Time	
Weather Conditions	
Neighborhood Character	
❍ Land use: residential, commercial, industrial or mixed use?	
❍ Community facilities: schools, parks, libraries?	
❍ Surface parking lots?	
❍ Buildings occupied?	
❍ Building facades – blank walls, engaging storefronts, sidewalk cafes?	
❍ Is there street activity?	
Street Description	
❍ Arterial or local	
❍ Number and estimated width of travel lanes – narrow, adequate, wide?	
❍ Parking – none, one or both sides?	
❍ Sidewalks – none, one or both sides?	
Vehicular Traffic	
❍ Posted speed limit signs	
❍ Estimated vehicle speeds	
❍ Volume	
Sidewalks	
❍ On both sides of the street?	
❍ Wide? Continuous? Smooth surface?	
❍ Curb ramps/detectable warning strips?	
❍ Buffered from traffic with landscape strips (verge)?	
❍ Minimal number of interrupting driveways? Narrow or wide driveways?	
❍ Are newspaper racks, outdoor seating organized?	

Street furnishings	
❍ Trees?	
❍ Benches?	
❍ Trash receptacles?	
❍ Bicycle accommodations?	
❍ Lighting?	
Crosswalks	
❍ Condition?	
❍ Design: 2 lines, zebra/ladder, stamped, pavers? Raised?	
❍ Marked and signed?	
Traffic signals	
❍ Pedestrian-activated? Countdown signals?	
❍ Timing – enough time to cross? Traffic stops in all directions? Traffic stops only in lanes pedestrian is crossing?	
❍ Right turn on red prohibited?	
Sight lines/Visibility	
❍ Obstacles – vegetation, light poles, parked cars?	
❍ Road design – curves, elevation change?	
Pedestrian Safety Countermeasures	
❍ Curb extensions?	
❍ Pedestrian refuge islands or medians?	
❍ In-street pedestrian signs?	
❍ Speed tables?	
Accessibility	
❍ Curb ramps?	
❍ Detectable warning strips?	
❍ Slopes/cross-slopes?	